

GENETIC VARIABILITY STUDIES IN *MANILKARA HEXANDRA* L. (KHIRNI) UNDER AKOLA CONDITIONS

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ABSTRACT

Study was carried out to find out the extent of variability, among the available khirni germplasm at Main Garden Department of Horticulture, Dr. PDKV and Akola. Thirty one genotypes of seedling origin were selected for study. The results revealed the significant variation, among the genotypes. The tree height varied from 3.8m to 15.4m. The tree spread in East-West and North-South direction, ranged from 4.4m to 10.3m and 4m to 11.8m, respectively. Three types of tree habit i. e. Upright, Spreading and Drooping and two types of branching habit i. e. In whorls and Irregularity were observed. The maximum leaf area was 52.08cm² and minimum leaf area was 24.17cm². The flowering time varied from first week of October to third week of November. Fascicle length found in between 0.57cm to 3.03cm and number of flowers per fascicle, ranged from 9.00 to 26.67.

KEYWORDS: Khirni, Root Stock, Fascicle & Genetic Variability

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INTRODUCTION

Khirni (*Manilkara hexandra* Roxb) Dubard syn. (*Mimusops hexandra* Roxb.), belongs to the family sapotaceae. It is believed to be originated in India (Steward and Brandis 1992). It occurs naturally in forests and common lands, particularly in Central and Deccan peninsular, India. The tree is evergreen, long lived, small to medium size, 10-12m in height with a spreading crown, straight growing and massive bole. Flowering occurs in the month of October–November–December and fruit ripens during April–May. (Dwivedi and Bajpai 1974) The production in India is mainly concentrated in the drier states and the produce is collected by the villagers, and sold in the local market. Ripe fruits are eaten fresh or after dehydration, they are sweet but astringent. The seed contains 24.6% of edible oil. Bark and fruits are also used for several medicinal purposes like treatment of ulcers, dyspepsia, opacity of cornea, bronchitis, urethrorrhea, leprosy, etc. (Pareek *et al.* 1998). Besides different medicinal and social uses of Khirni, it is commercially used as rootstock for grafting of sapota plant. In terms of yield, trees grafted on Khirni gave 50 percent more than that on air layers and twice that on sapota seedling stock. Khirni is highly heterozygous, cross pollinated fruit crop. Due to predominant cross pollination and seed propagation, wide variation exists among the genotypes, with respect to tree size, shape, flowering time, flower characters etc. (Considerable variability was also reported by Patel *et al.* (2005) in jamun in Uttar pradesh and Malik *et al.* (2012) in Khirni in central india). Present experiment was undertaken to find out the extent of variability in available germplasm of Khirni, so that this variation can be further utilized in crop improvement programmes.

MATERIALS AND METHODS

The present investigation was carried out on twenty seven years old khirni orchard, during the year 2015-2016 at Main Garden Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. In the present investigation, 31 genotypes were selected, which have produced flowers during October-November, 2015. One plant of each treatment selected, marked, and kept under observations for recording various observations. The observations recorded were as per the keys explained by Rodríguez-Medina *et al.* (2010). Since the study is based on single plant observation, the samples for observations were collected from each direction i.e., East, West, South and North, and each of these directions were considered as one replication. The observations were recorded on tree, flower and leaf characters. Further, the observed characteristics were subjected to RBD analysis.

RESULTS AND DISCUSSIONS

The collected data revealed significant variation, among the genotypes. The performance of the genotypes for three characters was studied, based on comparing the standard deviation. The range of the tree height was recorded in between 3.8m (MGK52) to 15.4 m (MGK9). The mean tree height of thirty one genotypes was 9.94m. The range of tree spread in east-west direction was 4.4m (MGK42) to 10.3m (MGK31). The mean tree spread in east-west direction of studied genotypes was 7.42m. The tree spread in north-south direction varied from 4m (MGK41) to 11.4m (MGK9). The mean tree spread in north-south direction was 7.85m.

Various scores were assigned to different tree habit and branching habit, based on sapota plant descriptor prescribed by NBPGR. In tree habit 3-Upright, 5-spreading and 7-Drooping, in branching habit 1-In whorls and 2-Irregular scores were assigned. Ten genotypes had showed the upright (3) growth habit, ten genotypes had showed spreading growth (5) habit and eleven genotypes had drooping (7) growth habit. The results obtained are similar with Mathew *et al.* (2001), in sapota. Ten genotypes exhibited in whorls type of branching habit and twenty one genotypes exhibited irregular type of branching habit. In whorls type of branching habit was found in upright and spreading type of tree habit.

The variation, with respect to leaf and flower characters was presented in Table 1. The maximum leaf area was recorded in MGK63 (52.08cm²) and minimum in MGK8 (24.17cm²). The genotype MGK22 is also at par with MGK63. The fascicle length was maximum in MGK22 (0.57cm) and minimum in MGK61 (3.03cm). The number of flowers per fascicle was highest in MGK52 (26.67) and lowest in MGK65 (9). The flowering time varied from first week of October (MGK6) to third week of November (MGK9, MGK22, MGK27, MGK41 and MGK45). Singh *et al.* (2005) also reported similar results in mahua and Malik *et al.* (2012), also observed similar results in khirni. The genotypes MGK63, MGK52, MGK31 and MGK3 were found promising, with respect to fascicle length and number of flowers per fascicle and leaf area.

CONCLUSIONS

High genotypic and phenotypic coefficient of variation was observed for number of flowers per fascicle, fascicle length and leaf area. High order of heritability and expected genetic advance as percentage over mean was observed for leaf area, fascicle length and number of flowers per fascicle. The genotypes MGK63, MGK52, MGK31 and MGK3 were found promising with respect to fascicle length and number of flowers per fascicle and leaf area.

Table 1: Variability of Khirni Genotypes Based on Tree Characters

Genotypes	Tree Height	Tree Spread		Tree Habit	Branching Habit
		E-W	N-S		

MGK3	12.00	9.40	11.20	7	1
MGK5	12.15	9.75	10.50	5	2
MGK6	12.50	9.80	5.70	5	2
MGK7	12.00	9.50	10.20	3	1
MGK8	11.00	8.40	9.80	3	2
MGK9	15.40	9.00	11.80	7	2
MGK12	8.80	6.70	5.50	3	1
MGK14	10.30	7.90	9.80	7	1
MGK15	14.00	8.50	9.70	5	2
MGK16	10.50	5.80	7.10	5	2
MGK17	11.00	5.50	6.70	3	2
MGK22	10.10	5.90	7.60	7	1
MGK25	9.80	5.80	5.60	3	1
MGK26	8.60	5.80	5.50	3	2
MGK27	11.90	6.10	7.40	7	2
MGK28	10.60	7.50	9.30	7	1
MGK31	11.70	10.30	6.10	7	2
MGK32	10.80	7.30	10.30	7	2
MGK34	10.30	7.90	6.50	7	2
MGK41	9.90	7.80	4.00	5	2
MGK42	7.40	4.40	6.40	3	1
MGK43	10.40	5.80	5.40	3	2
MGK45	7.00	5.50	6.90	5	2
MGK51	7.80	9.20	5.10	7	2
MGK52	3.80	5.00	8.60	5	2
MGK58	8.48	7.40	8.70	5	2
MGK59	9.36	10.1	11.10	5	2
MGK61	7.94	7.60	8.00	5	2
MGK63	9.38	8.60	7.40	7	2
MGK64	6.48	5.30	7.00	3	1
MGK65	6.86	6.40	8.60	3	1
Mean	9.94	7.42	7.85		
Std dev.	2.35	1.71	2.09		

Table 2: Variability in Khirni Genotypes Based on Leaf and Flower Characters

Genotypes	Leaf Area (cm ²)	Fascicle Length (cm)	Number of Flowers Per Fascicle	Flowering Time
MGK3	35.20	1.27	21.67	Second week of October
MGK5	26.52	0.87	11.67	Third week of October
MGK6	45.67	0.60	14.33	First week of October
MGK7	40.47	1.80	10.67	Fourth week of October
MGK8	24.17	1.23	10.67	First week of November
MGK9	35.08	1.10	19.67	Third week of November
MGK12	24.35	0.97	11.00	Fifth week of October
MGK14	34.03	1.93	21.67	Second week of November
MGK15	40.18	1.10	19.33	First week of November
MGK16	35.08	0.87	18.33	Fourth week of October
MGK17	25.17	1.40	12.67	Second week of November
MGK22	49.40	0.57	22.00	Third week of November
MGK25	33.92	1.63	14.33	First week of November
MGK26	41.03	2.57	21.00	Second week of November
MGK27	32.33	1.53	15.00	Third week of November
MGK28	35.02	2.73	11.67	Fifth week of October
MGK31	39.33	2.17	23.33	Second week of November
MGK32	39.75	0.87	9.67	Fourth week of October
MGK34	29.17	2.13	18.67	Third week of October

MGK41	41.88	2.43	18.00	Third week of November
MGK42	32.07	2.03	12.00	Fourth week of October
MGK43	45.75	1.40	14.00	First week of November
MGK45	37.12	1.00	17.67	Third week of November
MGK51	29.08	2.40	22.33	Second week of November
MGK52	27.38	1.83	26.67	First week of November
MGK58	37.42	2.20	17.00	First week of November
MGK59	40.92	1.87	12.67	Second week of November
MGK61	26.67	3.03	11.00	Fourth week of October
MGK63	52.08	2.73	11.00	First week of November
MGK64	27.42	1.47	11.67	Second week of November
MGK65	26.15	1.97	9.00	Third week of October
CD(5%)	3.20	0.35	2.31	
SE(m)	1.13	0.12	0.82	

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